$$DF(x_k)\,s = -F(x) \qquad x_{k+1} = x_k + s$$

Exemplul 10

$$x_0 = [1; 2]$$

$$v - u^3 = 0$$

$$u^2 + v^2 - 1 = 0$$

$$f_1(u,v) = -u^3 + v \qquad DF = \begin{bmatrix} -3u^2 & 1 \\ 2u & 2v \end{bmatrix}$$

$$f_2(u,v) = u^2 + v^2 - 1$$

pas 0: $DF(x_0)\cdot s_0 = -F(x_0)$

$$\begin{bmatrix} -3 & 1 \\ 2 & 4 \end{bmatrix} \begin{bmatrix} s_{10} \\ s_{20} \end{bmatrix} = -\begin{bmatrix} 1 \\ 4 \end{bmatrix}$$

$$s_{10} = 0 \qquad s_{20} = -1$$

$$x_1 = x_0 + s_0 = (1, 1)$$

pas 1

$$\begin{bmatrix} -3 & 1 \\ 2 & 2 \end{bmatrix} \begin{bmatrix} s_{11} \\ s_{21} \end{bmatrix} = -\begin{bmatrix} 0 \\ 1 \end{bmatrix}$$

$$s_1 = \left(-\frac{1}{8}, -\frac{3}{8}\right)$$

$$x_2 = x_1 + s_1 = \left(\frac{7}{8}, \frac{5}{8}\right)$$

+ cont. la pași

Aplicaţi un pas din metoda lui Newton cu vectorul iniţial $[1, 1]^T$ pentru sistemul de mai jos (10p):

$$\begin{cases} u^2 - 4v^2 = 4 \\ (u-1)^2 + v^2 = 4. \end{cases}$$

$$f_1(u, v) = u^2 - 4v^2 - 4$$

$$f_2(u, v) = u^2 - 2u + 1 + v^2 - 4 =$$

$$= u^2 - 2u + v^2 - 3$$

$$DF = \begin{bmatrix} 2u & -8v \\ 2u-2 & 2v \end{bmatrix}$$

$$x_0 = [1, 1]$$

$$DF(x_0)\, s_0 = -F(x_0)$$

$$\begin{bmatrix} 2 & -8 \\ 0 & 2 \end{bmatrix} \begin{bmatrix} s_{10} \\ s_{20} \end{bmatrix} = -\begin{bmatrix} -7 \\ -3 \end{bmatrix}$$

$$s_1 = \left(-\frac{5}{2}, -\frac{3}{2}\right)$$

$$x_1 = x_0 + s_1$$